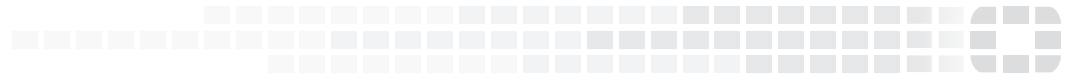




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FortiGate-7030 System Guide



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Friday, June 23, 2017

FortiGate-7030 System Guide

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FortiGate-7030E Chassis

The FortiGate-7030E is a 6U 19-inch rackmount 3-slot chassis with a 80Gbps fabric and 1Gbps base backplane designed by Fortinet. The fabric backplane provides network data communication and the base backplane provides management and synch communication among the chassis slots. Power is provided to the chassis using three hot swappable 2+1 redundant 100-240 VAC, 50-60 Hz power supply units (PSUs). You can also optionally add a fourth PSU. The FortiGate-7030E can also be equipped with DC PSUs allowing you to connect the chassis to -48V DC power.

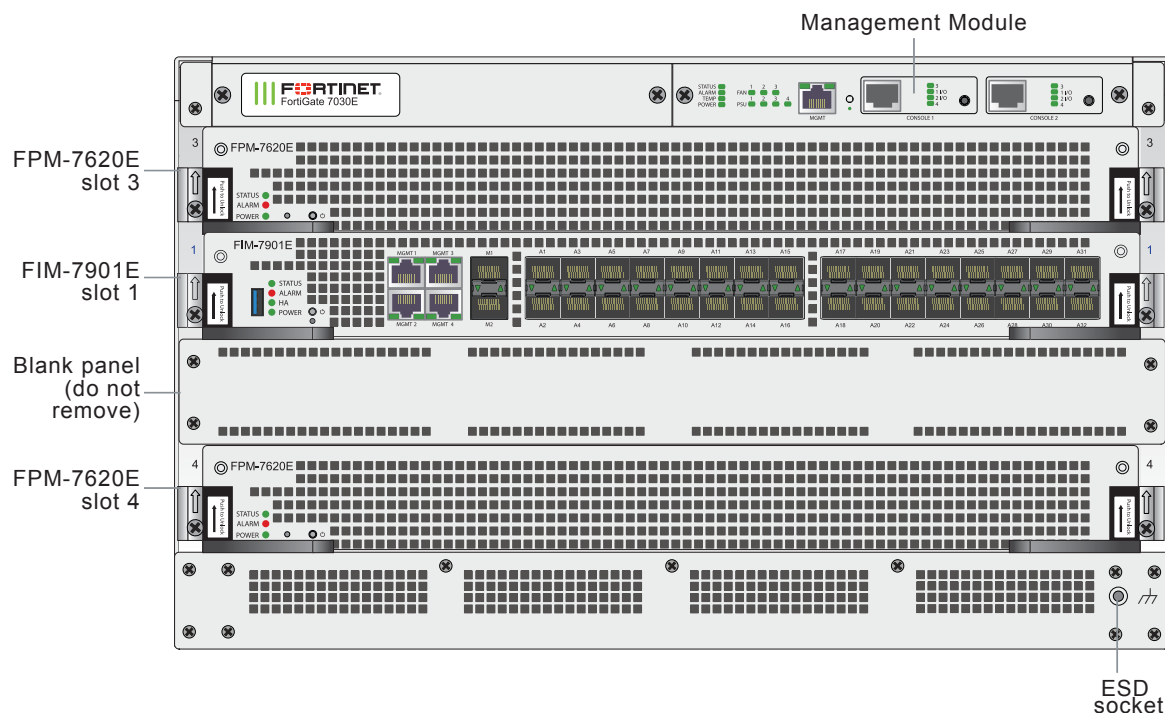
FortiGate-7030E front panel

The chassis is managed by a single management module that includes an Ethernet connection as well as two switchable console ports that provide console connections to the modules in the chassis slots. The management module controls chassis cooling and power management and provides an interface for managing the modules installed in the chassis. The standard configuration of the FortiGate-7030E includes one FIM (interface) module in chassis slot 1 and two FPM (processing) modules in chassis slots 3 and 4. The front panel also includes a sealed blank panel. Breaking the seal or removing the panel voids your FortiGate-7030E warranty.

The FortiGate-7030E is available in two versions:

- 7030E QSFP28 and includes one FIM-7920E and two FPM-7620Es
- 7030E SFP10G and includes one FIM-7901E and two FPM-7620Es

FortiGate-7030E front panel (example module configuration)





Do not operate the FortiGate-7030E chassis with open slots on the front or back panel. For optimum cooling performance and safety, each chassis slot must contain an FIM or FPM module or an FIM or FPM blank panel (also called a dummy card). For the same reason, all cooling fan trays, power supplies or power supply slot covers must be installed while the chassis is operating.

FIM modules

FIM modules are hot swappable interface modules that provide data and management interfaces, base backplane switching and fabric backplane session-aware load balancing for the chassis. The FIM modules include an integrated switch fabric and DP2 processors to load balance millions of data sessions over the chassis fabric backplane to FPM processor modules. The following FIM modules are available for the FortiGate-7030E:

- The FIM-7901E includes thirty-two front panel 10GigE SFP+ fabric channel interfaces (A1 to A32). These interfaces are connected to 10Gbps networks. These interfaces can also be configured to operate as Gigabit Ethernet interfaces using SFP transceivers.
- The FIM-7920E includes four front panel 100GigE QSFP28 fabric channel interfaces (C1 to C4). These interfaces can be connected to 100Gbps networks. Using a 100GBASE-SR4 QSFP28 or 40GBASE-SR4 QSFP+ transceiver, each QSFP28 interface can also be split into four 10GBASE-SR interfaces and connected to 10Gbps networks.

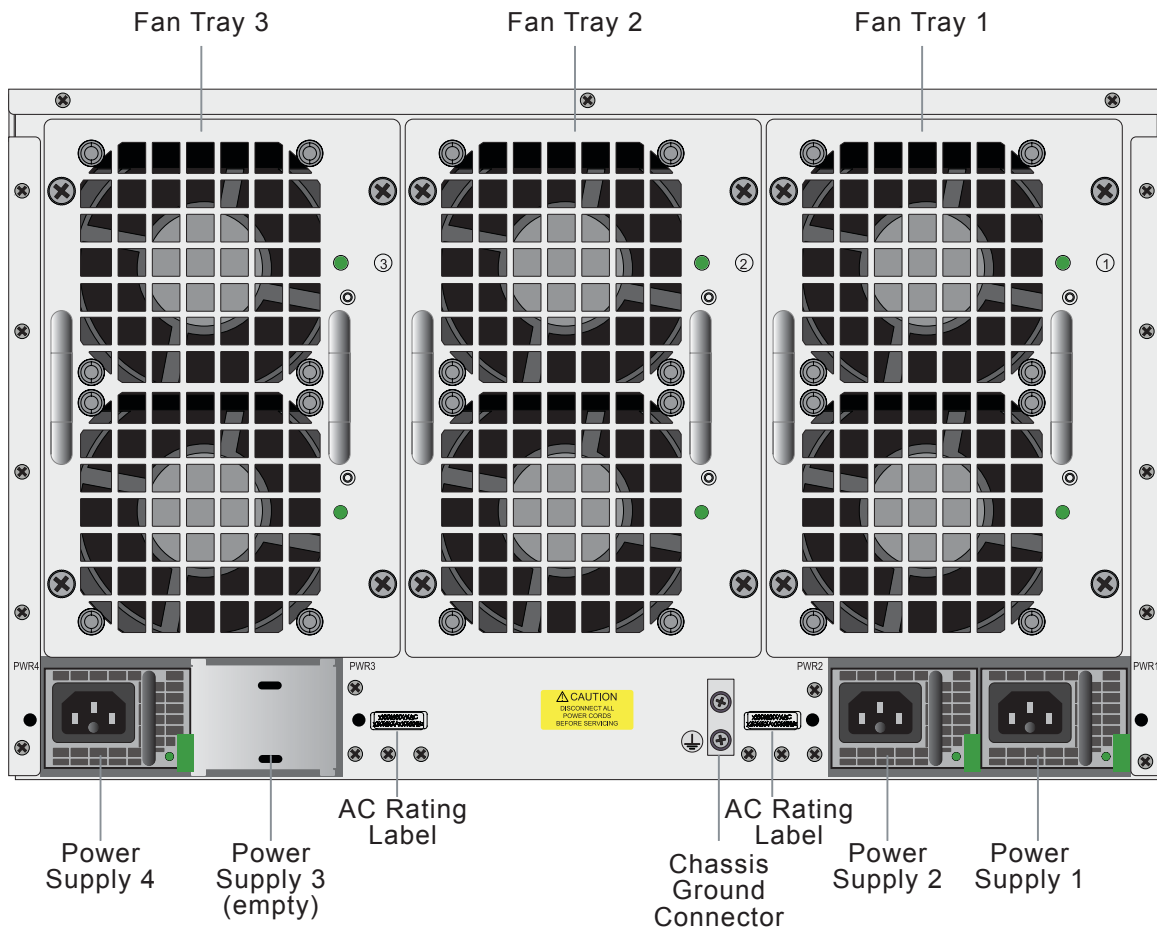
FPM-7620E FPM modules

The FPM-7620E modules are hot swappable processor modules that provide FortiOS firewalling and security services. The FPM modules function as workers, processing sessions load balanced to them by the FIM module. FPM modules include multiple NP6 network processors and CP9 content processors to accelerate traffic.

FortiGate-7030E back panel

The FortiGate-7030E chassis back panel provides access to three hot swappable cooling fan trays and three hot swappable AC or DC PSUs. A fourth slot is available for including a fourth power supply for additional redundancy. At least two PSUs (PWR1 and PWR2) must be connected to power. PWR4 is a backup power supply. You can add a fourth power supply to PWR3 to provide a second backup power supply. The back panel includes the FortiGate-7030E chassis ground connector that must be connected to ground.

FortiGate-7030E back panel

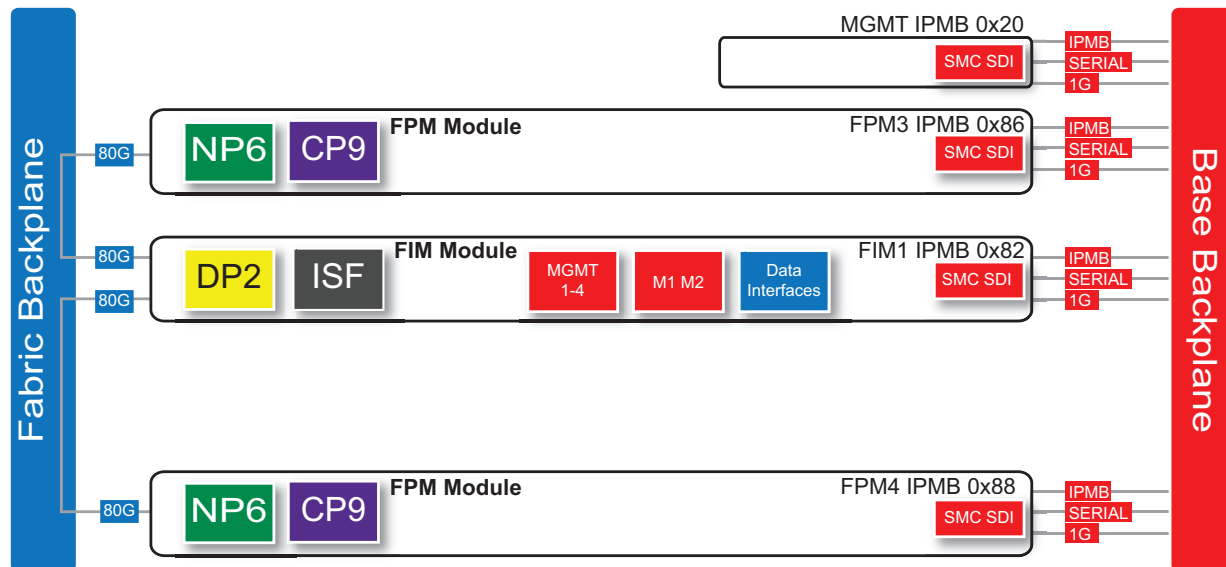


Registering your FortiGate-7030E chassis

FortiGate-7000 series products are registered according to the chassis serial number. You need to register your chassis to receive Fortinet customer services such as product updates and customer support. You must also register your product for FortiGuard services. Register your product by visiting <https://support.fortinet.com>. To register, enter your contact information and the serial numbers of the Fortinet products that you or your organization have purchased.

FortiGate-7030E chassis schematic

The FortiGate-7030E chassis schematic below shows the communication channels between chassis components including the management module (MGMT), the FIM module (called FIM1) and the FPM modules (FPM3 and FPM4).



The management module (MGMT, with IPMB address 0x20) communicates with all modules in the chassis over the base backplane. Each module, including the management module includes a Shelf Management Controller (SMC). These SMCs support Intelligent Platform Management Bus (IPMB) communication between the management module and the FIM and FPM modules for storing and sharing sensor data that the management module uses to control chassis cooling and power distribution. The base backplane also supports serial communications to allow console access from the management module to all modules, and 1Gbps Ethernet communication for management and heartbeat communication between modules.

FIM1 (IPMB address 0x82) is the FIM module in slot 1. The interfaces of this module connect the chassis to data networks and can be used for Ethernet management access to chassis components. The FIM module include DP2 processors that distribute sessions over the Integrated Switch Fabric (ISF) to the NP6 processors in the FPM modules. Data sessions are communicated to the FPM modules over the 80Gbps chassis fabric backplane.

FPM3 and FPM4 (IPMB addresses 0x86 and 0x88) are the FPM processor modules in slots 3 and 4. These worker modules process sessions distributed to them by the FIM module. FPM modules include NP6 processors to offload sessions from the FPM CPU and CP9 processors that accelerate content processing.

Chassis hardware information

This section introduces FortiGate-7030E hardware components and accessories including power requirements and FIM and FPM modules that can be installed in the chassis.

Shipping components

The FortiGate-7030E chassis ships pre-assembled with the following components:

- The 6U FortiGate-7030E chassis
- One FIM module
- Two FPM modules
- One management module installed in the front of the chassis
- Three Power Supply Units (PSUs) installed in the back of the chassis

- Three cooling fan trays installed in the back of the chassis
- One protective front panel installed in the chassis to protect internal chassis components. This panel must be removed before installing FIM and FPM modules.
- Three power cords with C15 power connectors
- Four power cord management clamps
- One set of 4-post rack mounting components
- One set of 2-post rack mounting components
- One pair of cable management side brackets
- Two front mounting brackets
- Twenty M4x6 flat-head screws
- Six M4x8 large head pan-head screws
- Six rubber feet
- Two console cables
- One RJ-45 Ethernet cable

Optional accessories and replacement parts

The following optional accessories can be ordered separately:

SKU	Description
FG-7030E-FAN	FortiGate-7030E fan tray.
FG-7030E-PS-AC	1500W AC power supply units (PSUs) for the FortiGate-7030E.
FG-7030E-SMM	FortiGate-7030E management module.
FG-7030E-CHASSIS	FortiGate-7030E chassis including 1x management module, 3x fan trays, and 3x AC PSUs.

You can also order the following:

- Additional FIM and FPM modules
- Transceivers
- DC PSUs
- Air Filter kit
- FPM and FIM single slot cover trays to be installed in empty chassis slots

Physical description of the FortiGate-7030E chassis

The FortiGate-7030E chassis is a 6U chassis that can be installed in a standard 19-inch rack. The following table describes the physical characteristics of the FortiGate-7030E chassis.

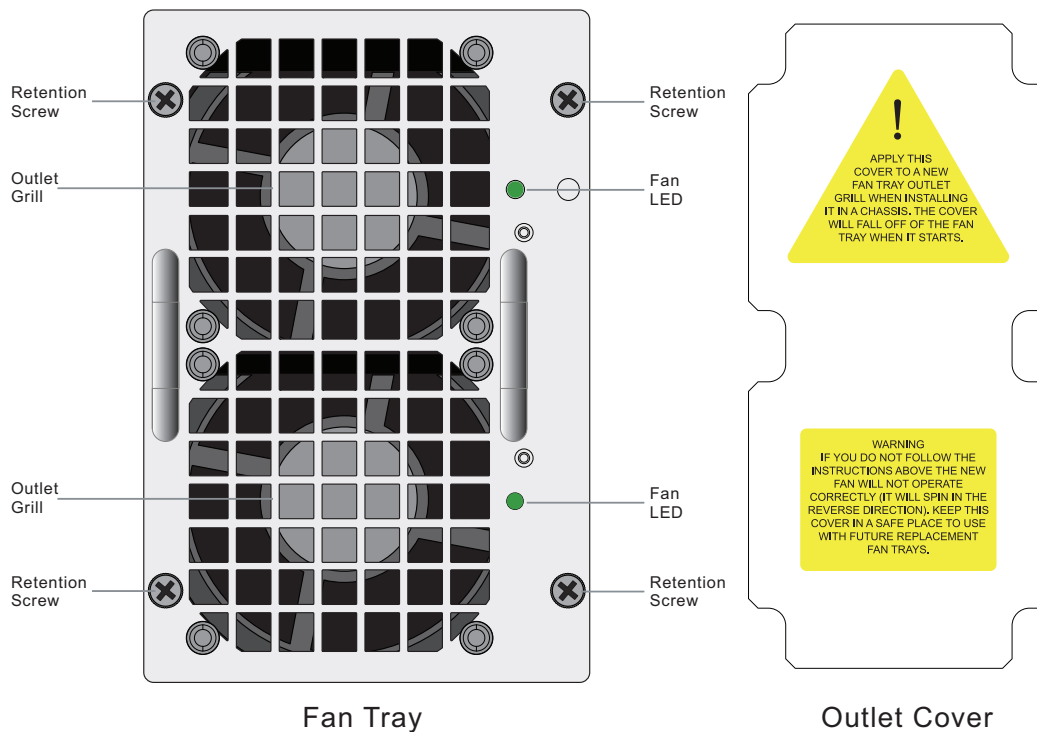
Dimensions (H x W x D)	10.4 x 17.3 x 25.6 in (264 x 440 x 650 mm)
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Chassis weight completely assembled with FIM and FPM modules installed	134.3 lbs (61 kg)
Operating Temperature	32 to 104°F (0 to 40°C)
Storage Temperature	-31 to 158°F (-35 to 70°C)
Relative Humidity	10% to 90% non-condensing
Noise Level	63db
Input Voltage Range	100 to 240 VAC (50 to 60 Hz)
Power Support Rating	1500W@240VAC and 1200W@120VAC
Supplied Power Supply Units (PSUs)	3 (for 2+1 redundancy)
Max Power Supply Units (PSUs)	4 (for 2+2 redundancy)
Max Power Consumption	1940W
Average Power Consumption	1390W
Max Current	110V/15A
Heat Dissipation	6619 BTU/hr
Joules/hr	6977 KJ/hr

Cooling fans, cooling air flow, and minimum clearance

The FortiGate-7030E chassis contains three hot swappable cooling fan trays installed in the back of the chassis. Each fan tray includes two fans that operate together. The fan tray includes two LEDs, one for each fan. When these LEDs are green both fans are operating normally. If one of the LEDs turns red or goes off, that fan is not working and the fan tray should be replaced.

Cooling Fan Tray and Outlet Cover



Fan trays are hot swappable. You can replace a failed fan tray while the chassis is operating. To replace a fan tray, unscrew the four retention screws and use the handles to pull the fan tray out of the chassis. Then apply the fan outlet cover to the outlet grill of the new fan tray. Install the new fan tray by sliding it into place. As you slide the new fan into place it will power up and the fan outlet cover will fall off of the fan tray. Tighten the retention screws.

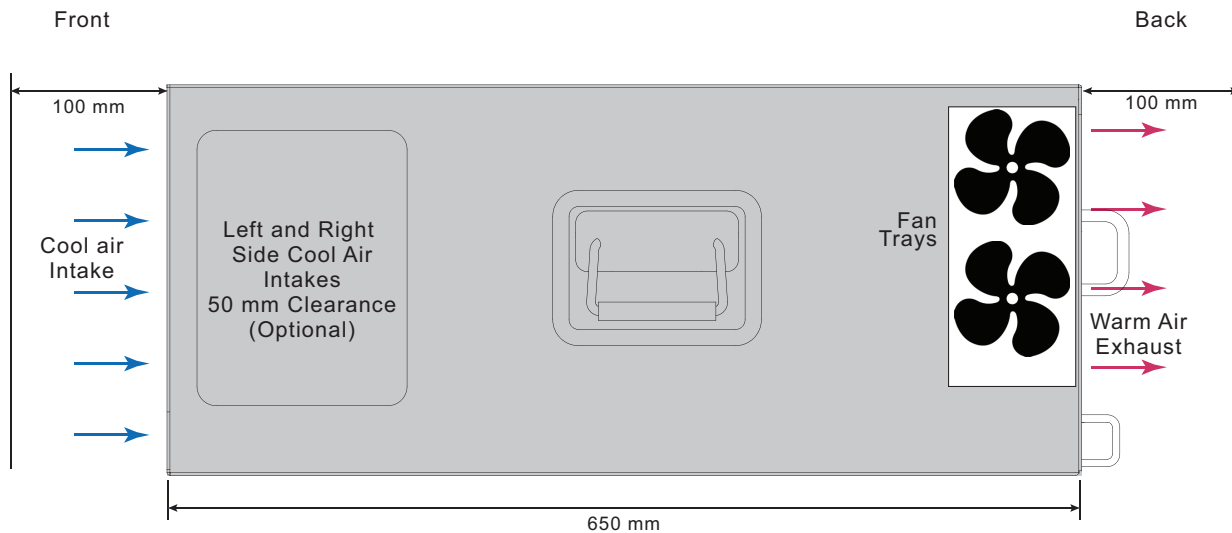
The other fan trays will continue to operate and cool the chassis as a fan tray is being removed and replaced. However an open fan tray slot will result in less air flow through the chassis so do not delay installing the replacement fan tray.

The FortiGate-7030E management module monitors the internal temperature of the chassis and adjusts the operating speed of the cooling fans as required. When the chassis is first powered on all cooling fans run at full speed. Once the management module is up and running, the management module reduces cooling fan speeds to maintain an optimum temperature in the chassis. If the management module is not installed or is not operating correctly the FortiGate-7030E chassis cooling fans always operate at full speed.

During normal operation, all fan trays are active. If cooling requirements increase, the fan speed will increase.

Cooling air flow and required minimum air flow clearance

When installing the chassis, make sure there is enough clearance for effective cooling air flow. The following diagram shows the cooling air flow through the chassis and the locations of fan trays. Make sure the cooling air intake and warm air exhaust openings are not blocked by cables or rack construction because this could result in cooling performance reduction and possible overheating and component damage.

FortiGate-7030E cooling air flow and minimum air flow clearance (chassis side view)

Most cool air enters the chassis through the chassis front panel and all warm air exhausts out the back. For optimal cooling allow 100 mm of clearance at the front and back of the chassis and 50 mm of clearance at the sides. Under these conditions 80% of cooling air comes from the front panel air intake and 20% from the left and right side panels and 100% exits out the back. Side clearance is optional and chassis cooling will be sufficient if no side clearance is available.

Optional Air Filters

You can purchase an optional NEBS compliant air filter kit that includes a front filter that fits over the front of the chassis and two filters for the side cool air intakes. These filters are not required for normal operation but can be added if you require air filtration.

The air filters should be inspected regularly. If dirty or damaged, the filters should be disposed of and replaced. The air filters can be fragile and should be handled carefully.

Power Supply Units (PSUs) and supplying power to the chassis

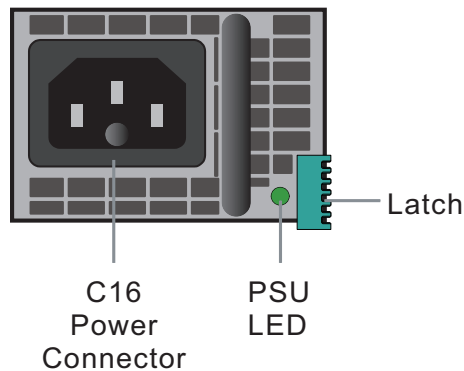
The FortiGate-7030E chassis back panel includes three hot swappable AC or DC PSUs. At least two PSUs (PWR1 and PWR2) must be connected to power. PWR4 is a backup power supply and provides 2+1 redundancy. You can add a fourth power supply to PWR3 to provide a second backup power supply and 2+2 redundancy. See [FortiGate-7030E front panel on page 5](#) for locations of the PSUs.

All PSUs should be connected to AC power. To improve redundancy you can connect each power supply to a separate power source.

Use a C15 Power cable, supplied with the chassis, to connect power to each PSU C16 power connector. C15/C16 power connectors are used for high temperature environments and are rated up to 120°C.

To remove a PSU from the chassis, press the latch towards the handle until the PSU is detached then pull it out of the chassis. Insert a replacement PSU into the chassis and slide it in until the latch locks into place. Then connect the PSU to AC power. You can do this while the chassis is operating as long as at least two PSUs remain connected to power.

AC Power Supply Unit (PSU) showing C16 power connector



The PSU LED indicates whether the PSU is operating correctly and connected to power. If this LED is not lit check to make sure the PSU is connected to power. If the power connection is good then the PSU has failed and should be replaced.

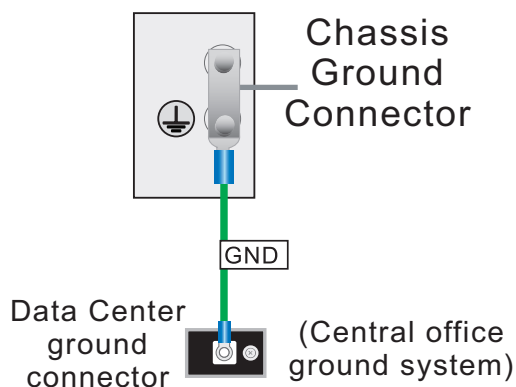
Connecting the FortiGate-7030E chassis to ground

The FortiGate-7030E chassis includes a ground terminal on the rear the bottom of the FortiGate-7030E back panel. The ground terminal provides two connectors to be used with a double-holed lug such as Thomas & Betts PN 54850BE. This connector must be connected to a local ground connection.

You need the following equipment to connect the FortiGate-7030E chassis to ground:

- An electrostatic discharge (ESD) preventive wrist strap with connection cord.
- One green 6 AWG stranded wire with listed closed loop double-hole lug suitable for minimum 6 AWG copper wire, such as Thomas & Betts PN 54850BE.

To connect the FortiGate-7030E chassis to ground



1. Attach the ESD wrist strap to your wrist and to an ESD socket or to a bare metal surface on the chassis or frame.
2. Make sure that the chassis and ground wire are not energized.

3. Connect the green ground wire from the local ground to the ground connector on the FortiGate-7030E chassis.
4. Secure the ground wire to the chassis.
5. Optionally label the wire GND.

Turning on FortiGate-7030E chassis power

Connect AC power to PWR1, PWR2 and PWR4. Once the FortiGate-7030E chassis is connected to power the chassis powers up. If the chassis is operating correctly, the LEDs on the PSUs and fans should be lit. As well, the LEDs on the FortiGate-7030E management module should be lit.

When the chassis first starts up you should also hear the cooling fans operating.

In addition, if any modules have been installed in the chassis they should power on and their front panel LEDs should indicate that they are starting up and operating normally.

FortiGate-7030E hardware assembly and rack mounting

The FortiGate-7030E chassis must be mounted in a standard 19-inch rack and requires 6U of vertical space in the rack. This chapter describes how to attach accessories to the FortiGate-7030E chassis, how to install the chassis in a 4-post or 2-post rack, and how to install FIM and FPM modules in the chassis front panel slots.

If you install the FortiGate-7030E chassis in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Make sure the operating ambient temperature does not exceed the manufacturer's maximum rated ambient temperature.



The FortiGate-7030E chassis should not be operated as a free-standing appliance.

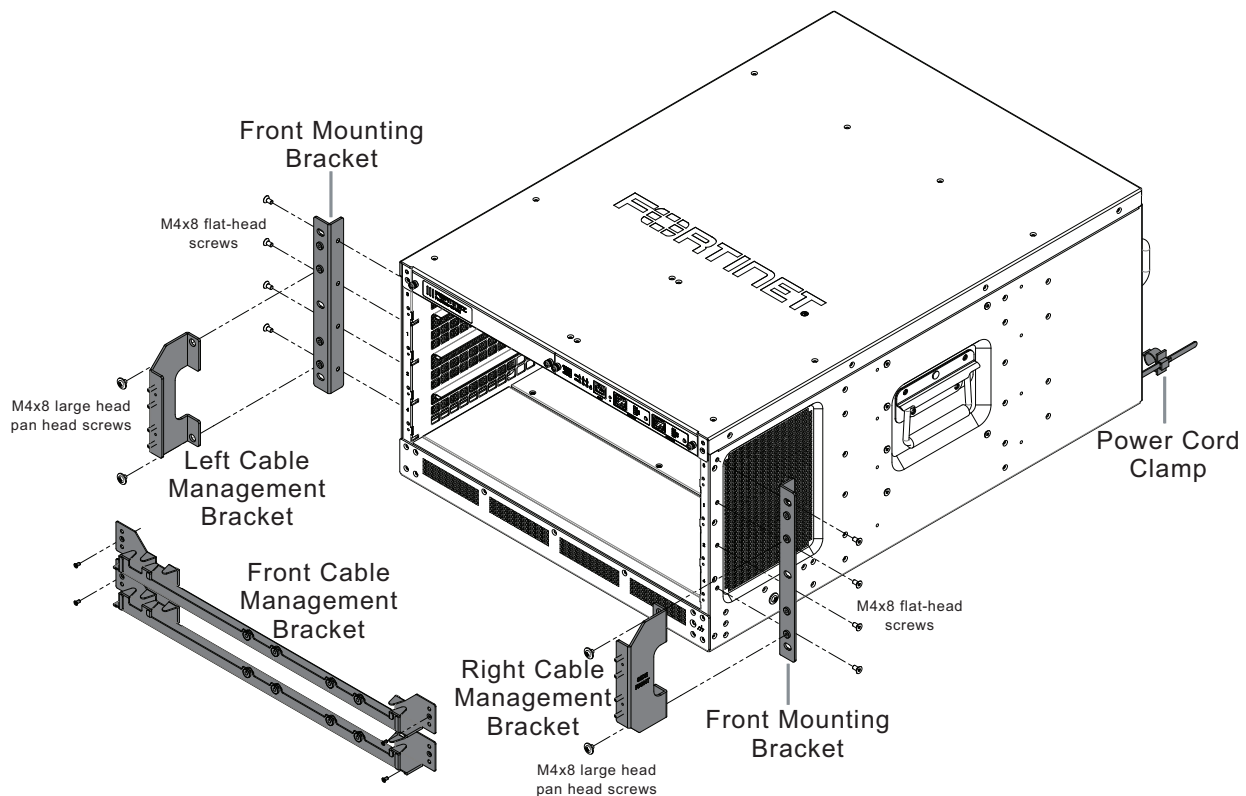


Install accessories before mounting the chassis in a rack. Install the modules after the chassis is rack mounted.

Installing accessories

These accessories are optional and not required for all configurations. If you have them, before mounting the chassis in a rack you should install the left and right front mounting brackets and the cable management brackets as shown in the following illustration.

Installing FortiGate-7030E accessories



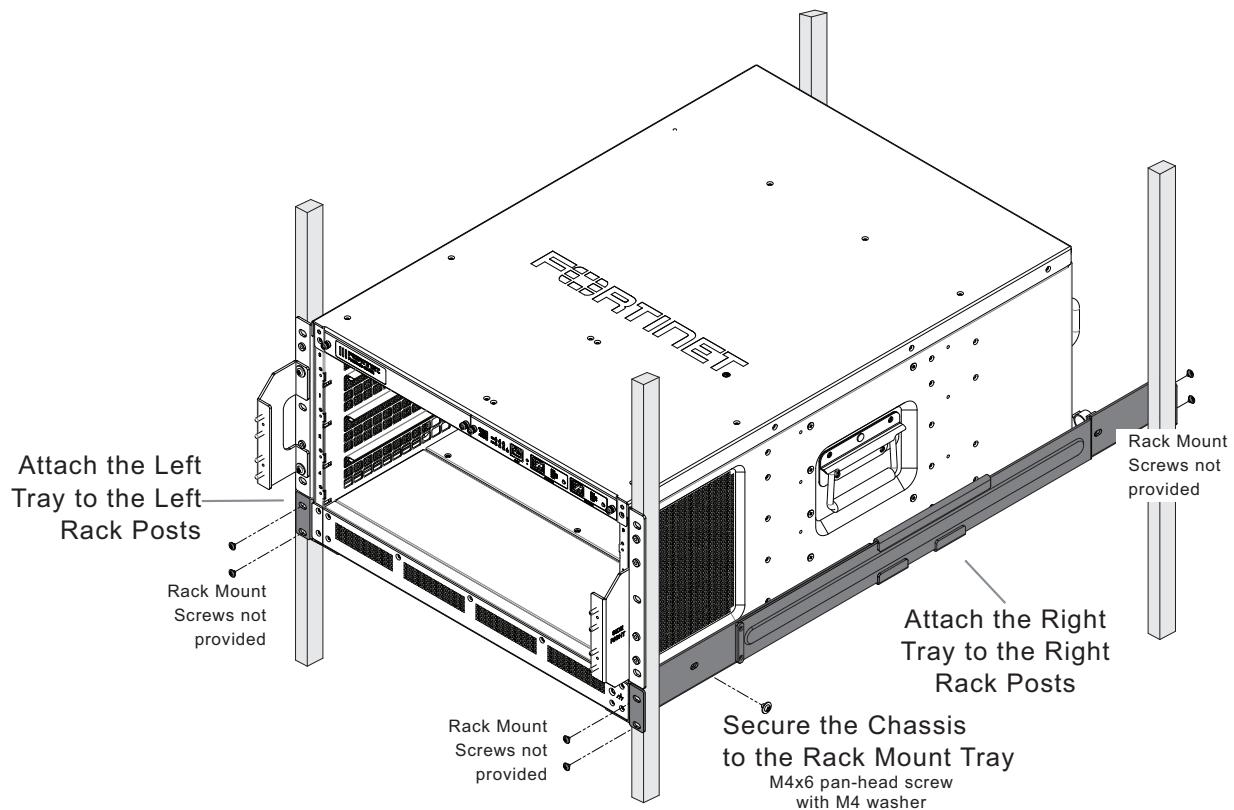
You can also install power cord clamps into the back of the chassis beside each PSU. Install the clamps by inserting them into the holes adjacent each supply at the back of the chassis. Use the clamps to secure the AC power cords so they are not accidentally disconnected.

Mounting the FortiGate-7030E chassis in a four-post rack

The FortiGate-7030E package includes a set of extendable brackets that you can use to mount the chassis in a 4-post rack. Install the brackets to create a 4-post rack mount tray that the chassis will slide on to. Attach each side of the tray to the 4-post rack using the front and back brackets as shown below. Make sure you install the tray with enough space above it for the chassis. The length of the tray sides adjusts to match your rack.

Once the 4-post rack mount tray has been installed, slide the chassis onto the tray and secure it to the rack mount tray as shown in the diagram.

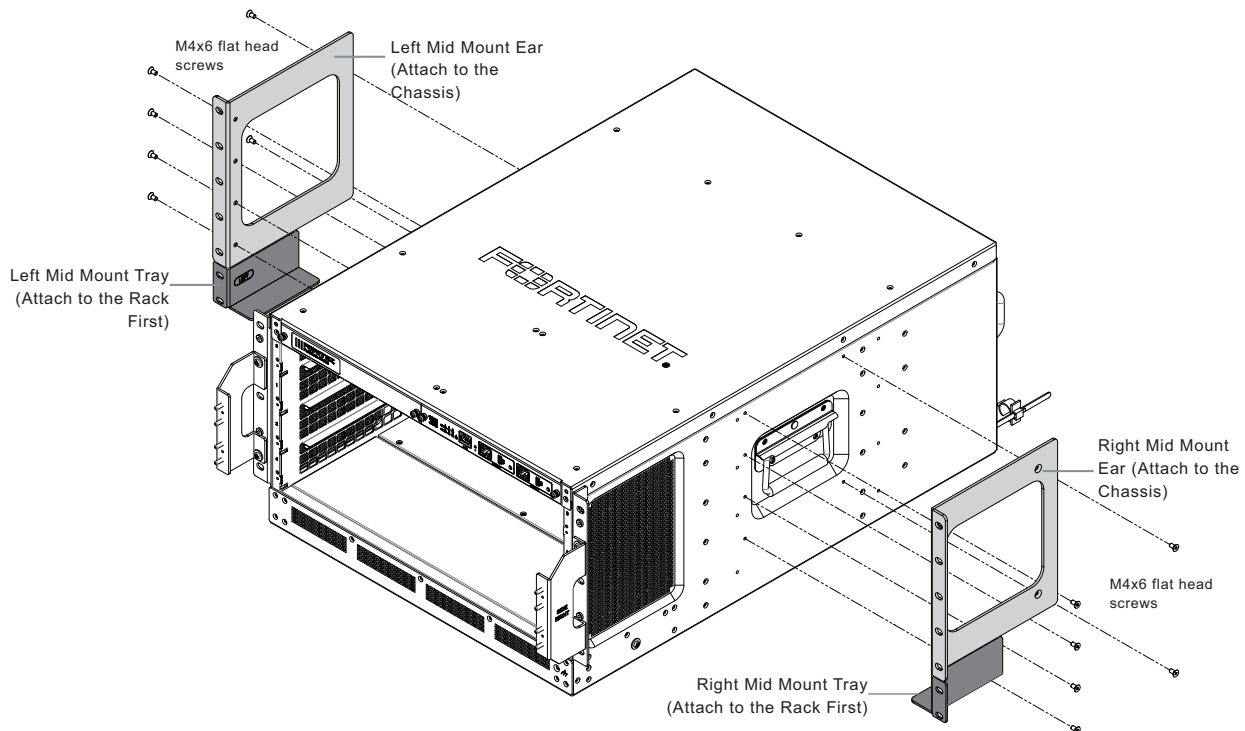
Mounting the chassis in a four-post Rack



Mounting the FortiGate-7030E chassis in a two-post rack

The FortiGate-7030E package includes two mid-mount trays and two mid-mount ears that you can use to mount the chassis in a 2-post rack. As shown in the diagram, first attach the mid-mount trays to the rack making sure to leave enough space above the trays for the chassis. Then attach the mid-mount ears to the chassis also as shown in the diagram. Finally line up the mid-mount trays with the mid-mount ears so that the chassis is supported in the rack. Then use screws to attach the mid-mount ears and the chassis to the rack.

Mounting the chassis in a 2-post rack



Air flow

For rack installation, make sure that the amount of air flow required for safe operation of the FortiGate-7030E chassis is not compromised. Make sure that the chassis ventilation openings at the front and back are not blocked by cables or other components. The recommended minimum clearance at the front of the chassis is 100 mm and the recommended clearance from the rear of the chassis is 60 mm. This results in a total footprint of 810 mm from front to back. See [Cooling air flow and required minimum air flow clearance on page 1](#) for more details.

Inserting FIM and FPM-7000 series modules

All FortiGate-7030E chassis are shipped with a protective front panel installed in the chassis to protect internal chassis components. This panel must be removed before you install FIM and FPM modules.

Insert an FIM module into chassis slot 1. Insert FPM modules into chassis slots 3 and 4.



Do not operate the FortiGate-7030E chassis with open slots on the front or back panel. For optimum cooling performance and safety, each chassis slot must contain an FIM or FPM module or an FIM or FPM blank panel (also called a dummy card). For the same reason, all cooling fan trays, power supplies or power supply slot covers must be installed while the chassis is operating.

To insert FIM and FPM modules, see the guide supplied with the module.



You must carefully slide the module all the way into the chassis slot, close the handles to seat the module into the slot, and tighten the retention screws to make sure the module is fully engaged with the backplane and secured. You must also make sure that the sliding latches are fully closed by gently pushing them down. The handles must be closed, the retention screws tightened and the latches fully closed for the module to get power and start up. If the module is not receiving power all LEDs remain off.

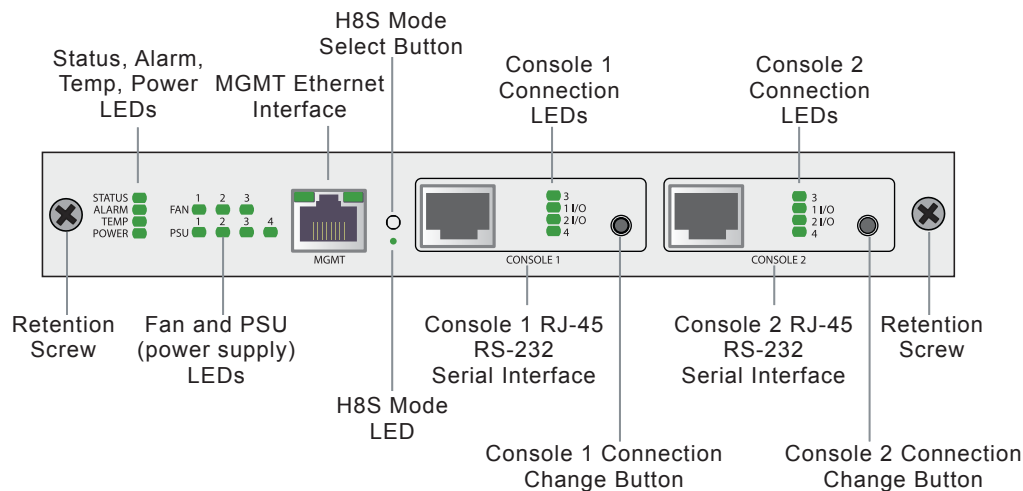


All FIM and FPM-7000 series modules must be protected from static discharge and physical shock. Only handle or work with these boards at a static-free workstation. Always wear a grounded electrostatic discharge (ESD) preventive wrist strap when handling these boards.

FortiGate-7030E Management Module

The FortiGate-7030E chassis includes a hot swappable management module (shelf manager), located at the top right of the chassis front panel.

FortiGate-7030E management module front panel



The management module communicates with Module SMCs in the chassis, each of which is responsible for local management of one or more Field Replaceable Units (FRUs), including FIM and FPM modules, fan trays, and power supplies. Management communication within a chassis occurs over the Intelligent Platform Management Bus (IPMB).

The management module also includes LED indicators that report on the status of many of the chassis components, including fans trays and power supplies. You can also use the management module console ports to connect to the management module CLI and to the CLI of the modules in chassis slots 1 to 4.

The management module controls chassis power allocation, monitors chassis operating parameters, monitors and controls chassis cooling, and generates alarms if the chassis encounters problems. All FIM and FPM modules installed in the chassis communicate with the management module through the module's IPMC.

The management module is hot swappable. You can replace the management module by loosening its retention screws, then pulling it out of the chassis. When the management module is removed, all chassis fans speed up to maximum speed. When an FIM or FPM module detects the absence of the management module for more than 30 seconds, the module will go to Standalone Mode. In standalone mode the modules autonomously control their own power. When a new management module is installed, it assumes control of chassis fans, and the FIM and FPM modules switch back to normal mode. In normal mode, FIM and FPM module power on/off requires authorization from the management module and the management module controls the power supplied by the chassis power systems to the modules.

The chassis can operate without a management module or with a management module that is not operating. As described above, if there is no functioning management module the chassis fans operate at maximum speed and the FIM and FPM modules in the chassis switch to standalone mode and manage their own power. So if a

management module breaks you should replace it, but the chassis and the modules in it will continue to operate until a replacement can be installed. If the management module stops operating, for optimum cooling performance you should keep it installed in the chassis until it can be replaced.

Each module in the chassis includes its own module Shelf Manager Controller (SMC) Serial Debug Interface (SDI) or SMC SDI console that communicates with the management module SMC SDI. You can connect a serial cable to the Management Module console ports to connect to the management module SMC SDI and to connect to each module's SMC SDI console. You can also interact with the SMC SDI consoles using an Intelligent Platform Management Interface (IPMI) tool.

Management Module LEDs

The following table describes the management Module LED indicators:

FortiGate-7030E Management Module LEDs

LED	State	Description
Status	Off	The management module is powered off or not initialized.
	Red	The management module is not operating normally either because it is starting up or because it has failed.
	Green	The management module has started up and is operating normally.
Alarm	Off	No alarms
	Red	One or more analog sensors in the chassis or on a module in the chassis (other than PSUs) have surpassed a critical or non-recoverable (NR) threshold causing an alarm. When a critical threshold has been reached, it means that a condition has been detected that has surpassed an operating tolerance. For example, a temperature has increased above the allowed operating temperature range.
	Amber	One or more analog sensors in the chassis or on a module in the chassis (excluding PSUs) has surpassed a major or critical (CR) threshold. Any sensor, including sensors on PSUs, has generated an alert. Sensor alert criteria is defined per sensor. For analog sensors, alerts usually mean passing an upper critical (UC) or lower critical (LC) threshold. For other sensors, an alert could mean a flag bit is indicating an anomaly.

LED	State	Description
Temp	Solid Green	All temperature sensors indicated acceptable operating temperatures.
	Blinking Green	At least one temperature sensor is detecting a high temperature outside of the normal operating range. In this case an upper non-critical (UNC) temperature. The management module increases fan speed to increase cooling and reduce the temperature.
	Blinking Red	At least one temperature sensor is detecting a temperature outside of the acceptable operating range. In this case an upper critical (UC) temperature. The management module increases fan speed to the maximum level. This also indicates possible problems with the cooling system and could mean that the ambient temperature is too high. Also causes a major or critical (CR) alarm.
	Solid Red	At least one temperature sensor is detecting a temperature outside of the allowed operating range. In this case an upper non-recoverable (UNR) temperature. The management module increases fan speed to the maximum level. The temperature is high enough to potentially cause physical damage. Also causes a critical or non-recoverable (NR) alarm.
Power	Solid Green	Normal operation.
	Blinking Green	Chassis 12V disabled. This means that the administrator has entered commands into the management module CLI to power off the PSU main 12V outputs. All fans, FIM and FPM modules are completely powered off but the management module is still running.
	Red	Chassis 12V enabled but not OK. This means the management module has enabled the main 12V outputs for all chassis components, but the power OK (PWOK) signal of at least one PSU has not been sent. When a PSU is powering up, it would be normal for this LED to be red for a second (before PSU outputs are stabilized), but if LED remains red, it indicates a problem (such as a failed PSU). Management module or FIM or FPM module voltage sensors would most likely also trigger alarms if this happens since the PSUs may not be delivering enough power.

LED	State	Description
FAN (LEDs for each of three fan trays)	Off	Fan tachometer sensors disabled. This could happen if the administrator disabled them from the management module CLI.
	Green	The fan tray is operating normally.
	Blinking Red	The fan tray is not working. Chassis cooling may be sufficient but redundancy is lost and the fan tray that is not working should be replaced.
	Red	A fan tachometer sensor in this fan tray has registered an alert because a critical or non-recoverable (NR) threshold has been crossed.
PSU (LEDs for each of six PSUs)	Off	The PSU is not installed in the chassis.
	Green	The PSU is present and operating normally.
	Blinking Red	The PSU module is installed but no power is being delivered (not plugged in).
Console 1 and 2	Red	The PSU's sensors have detected an alert condition. The PSU's analog sensors crossed critical or non-recoverable (NR) thresholds, or the PSU Status Failure bit has been set.
	Off	This console port is not connected or is connected to the management module SMM CLI.
	Green	This console port is connected to this module host console in this chassis slot.
	Amber	This console port is connected to this module's SMC console.

About management module alarm levels

Minor, major and critical alarms are defined based on both IPMI, ATCA, and Telco standards for naming alarms.

- A minor alarm (also called an IPMI non-critical (NC) alarm) indicates that a temperature or a power level was detected by a sensor that is outside of the normal operating range but is not considered a problem. In the case of a minor temperature alarm the system could respond by increasing fan speed. A non-critical threshold can be an upper non-critical (UNC) threshold (for example, a high temperature or a high power level) or a lower non-critical (UNC) threshold (for example, a low power level).
- A major alarm (also called an IPMI critical or critical recoverable (CR) alarm) indicates a temperature or power level was detected by a sensor that is far enough outside of the normal operating range to require attention from the operator. It could also mean that the system itself cannot correct the alarm. For example, the cooling system cannot provide enough cooling to reduce the temperature. It could also mean that conditions are close to being outside of the allowed operating range. For example, the temperature is close to exceeding the allowed operating

temperature. A critical threshold can also be an upper critical (UC) threshold (for example, a high temperature or a high power level) or a lower critical (LC) threshold (for example, a low power level).

- A critical alarm (also called an IPMI non-recoverable (NR) alarm) indicates a temperature or power level was detected by a sensor that is outside of the allowed operating range and could potentially cause physical damage.

You can use the management module CLI to get details about alarm sensors, thresholds, and the events that trigger alarms.

Using the console ports

The management module includes two console ports named Console 1 and Console 2 that can be used to connect to any serial console in the chassis. This includes the management module CLI, the FortiOS CLIs (also called host CLIs) of the FIM and FPM modules in chassis slots 1, 3 and 4 and all of the SMC SDI consoles in the chassis.



Each module, including the management module, includes an SMC SDI console. These consoles are used for low level programming of the module using an IPMI tool and are disabled by default. You can enable serial access to individual module SMC SDI consoles from the management module SMC SDI CLI using the command `serial set sdi enable <slot>`. During normal operation you may want to access the management module SMC SDI CLI, you shouldn't normally require access to individual module SMC SDI consoles.

By default when the chassis first starts up Console 1 is connected to the FortiOS CLI of the FIM module in slot 1 and Console 2 is disconnected.

The default settings for connecting to each console port are: Baud Rate (bps) 9600, Data bits 8, Parity None, Stop bits 1, and Flow Control None.

The FIM and FPM modules use the standard FortiOS CLI. The SMC SDI CLIs are described in this chapter.

You can use the console connection change buttons to select the CLI that each console port is connected to.

- Press the button to cycle through the FIM and FPM module FortiOS CLIs and disconnect this console.
- Press and hold the button to connect to the management module SMC SDI CLI. You can also cycle through each module's SMC SDI CLI if they are enabled.

The console's LEDs indicate what it is connected to. If no LED is lit the console is either connected to the management module SMC SDI console or disconnected. Both console ports cannot be connected to the same CLI at the same time. If a console button press would cause a conflict that module is skipped. If one of the console ports is disconnected then the other console port can connect to any CLI.

If you connect a PC to one of the management module console ports with a serial cable and open a terminal session you begin by pressing Ctrl-T to enable console switching mode, then you can do the following:

- Press Ctrl-T to cycle through the FIM and FPM module FortiOS CLIs (the new destination is displayed in the terminal window). If you press Ctrl-T after connecting to the FPM module in slot 4 the console is disconnected. Press Ctrl-T again to start over again at slot 1.
- Press Ctrl-R to connect to the management module SMC SDI CLI. You can also cycle through each module's SMC SDI CLI if they are enabled (the new destination is displayed in the terminal window). After cycling through all of the enabled SMC SDI CLIs the next press of Ctrl-R disconnects the console port.

Once the console port is connected to the CLI that you want to use, press Ctrl-G to enable the CLI. When your session is complete you can press Ctrl-G to disable the CLI.

Connecting to the FortiOS CLI of the FIM module in slot 1

Use the following steps to connect to the FortiOS CLI of the FIM module in slot 1:

1. Connect the console cable supplied with your chassis to Console 1 and to your PC or other device RS-232 console port.
2. Start a terminal emulation program on the management computer. Use these settings:
Baud Rate (bps) 9600, Data bits 8, Parity None, Stop bits 1, and Flow Control None
3. Press Ctrl-T to enter console switch mode.
4. Repeat pressing Ctrl-T until you have connected to slot 1.
5. Login with an administrator name and password.
The default is admin with no password.
For security reasons, it is strongly recommended that you change the password.
6. When your session is complete, enter the `exit` command to log out.

Connecting to the FortiOS CLI of the FPM module in slot 3

Use the following steps to connect to the FortiOS CLI of the FIM module in slot 3:

1. Connect the console cable supplied with your chassis to Console 1 and to your PC or other device RS-232 console port.
2. Start a terminal emulation program on the management computer. Use these settings:
Baud Rate (bps) 9600, Data bits 8, Parity None, Stop bits 1, and Flow Control None
3. Press Ctrl-T to enter console switch mode.
4. Repeat pressing Ctrl-T until you have connected to slot 3.
5. Login with an administrator name and password.
The default is admin with no password.
For security reasons, it is strongly recommended that you change the password.
6. When your session is complete, enter the `exit` command to log out.

Connecting to the management module SMC SDI CLI

Use the following steps to connect to the management module SMC SDI CLI:

1. Connect the console cable supplied with your chassis to Console 1 and to your PC or other device RS-232 console port.
2. Start a terminal emulation program on the management computer. Use these settings:
Baud Rate (bps) 9600, Data bits 8, Parity None, Stop bits 1, and Flow Control None
3. Use the console change button or Ctrl-R to switch to the management module SMC SDI CLI.
4. Press Ctrl-G to connect to the CLI.

5. Login with an administrator name and password.
The default administrator name and password are admin/admin.
For security reasons, it is strongly recommended that you change the password.
6. You can begin entering commands at the # prompt.
7. When your session is complete, enter the `exit` command to log out.
8. Optionally press Ctrl-G to disable the CLI.

Changing the management module admin account password

Use the following procedure to change the management module admin account password.

1. Enter the following command to show all users and their user IDs.
`user list`
The output should show that the `admin` user has a user ID of 2.
2. Use the command `user set password <user-id> [<password>]` to add a password for the admin account. For example:
`user set password 2 <password>`
3. Enter and confirm a new password for the `admin` account.
The password should be between 5 and 20 characters long and should include a combination of upper and lower case letters and numbers.
You can change the admin account password at any time.

Connecting to the management module using an IPMI tool

You can install a remote IPMI tool on a management computer and then use this IPMI tool to start an IPMI session with the management module. You can use one of the console ports or the MGMT port to connect with the IPMI tool.

The IPMI commands are the same as the CLI commands described in this chapter but they have to be prefixed as shown in the following example that changes the MGMT interface IP address to 172.20.120.30 over a serial connection:

```
sudo ipmitool -I serial-terminal -D /dev/ttyS1:9600 -U <username> -P <password> lan set 4  
ipaddr 172.20.120.30
```

Here is the same command over an Ethernet connection:

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U <username> -P <password> lan set 4  
ipaddr 172.20.120.30
```

Use the following IPMI commands to change the management module password:

First from a console port connection:

```
sudo ipmitool -I serial-terminal -D /dev/ttyS1:9600 -U <username> -P <password> user set  
password 2 <password>
```

And from an Ethernet connection:

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U <username> -P <password> user set  
password 2 <password>
```

To perform an operation on a module according to its chassis slot include the `-t <slot>` parameter in the IPMI command. For example, to list the sensors on the FIM module in chassis slot 1 (0x82), use the following IPMI command:

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U <username> -P <password0> -t 0x82
sensor
```

FortiGate-7030E chassis slots IPMB addresses

The following table lists the IPMB addresses of the FortiGate-7030E chassis slots.

Chassis slot number	Name	IPMB Address (FRUID)
Management module	MGMT	0x20
3	FPM3	0x86
1	FIM1	0x82
4	FPM4	0x88

You can use the IPMB address or chassis slot number to reference a chassis slot when entering commands in the shelf manager CLI. For example, enter either of the following commands to display sensor readings for the FIM module in slot 1:

```
sensor 0x82
sensor 1
```

When command syntax descriptions in this chapter include the `<slot>` variable you can replace it with a slot number (1, 3 or 4) or an IPMB address number (0x82, 0x86, or 0x88)

Rebooting a chassis module from the SMC SDI CLI

A common use of the SMC SDI CLI is being able to remotely reboot a FIM or FPM module.

From any SMC SDI CLI use the following command to reboot the module in slot 3:

```
mc reset 3 warm
```

Use the following command to power off the module in slot 4:

```
fru deactivate 4
```

Use the following command to power on the FIM module in slot 1 (IPMI address 0x82):

```
fru activate 0x82
```

Use the following IPMI command to reset the module SMC to reboot the module in slot 3:

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U admin -P admin -t 0x86 mc reset warm
```

Use the following IPMI command to power off the module in slot 4:

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U admin -P admin -t 0x88 picmg
deactivate 0
```

Use the following IPMI command to power on the FIM module in slot 1 (IPMI address 0x82):

```
sudo ipmitool -I lanplus -H 10.160.19.30 -k gkey -U admin -P admin -t 0x82 picmg activate
0
```

Comlog

All module SMCs include a comlog system for writing and saving console log messages. When enabled, the comlog saves log messages in a local comlog file. Log messages include all local host console messages including BIOS boot up messages. In the comlog these messages include the following headers:

Header	Cause
\n--- COMLOG SYSTEM BOOT: YYYY/MM/DD hh:mm:ss ---\n	The module is starting up after being powered on or reset.
\n--- COMLOG DISABLED: YYYY/MM/DD hh:mm:ss ---\n	Logging is disabled.
\n--- COMLOG ENABLED: YYYY/MM/DD hh:mm:ss ---\n	Logging is enabled
\n--- COMLOG TIME: YYYY/MM/DD hh:mm:ss ---\n	This message is written every hour when the module is powered on and logging is enabled.

The following comlog-related CLI commands are available:

Description	SMC SDI Commands	IPMI commands
Display comlog information.	comlog getinfo Status Disabled COM Speed 9600 Storage Size 0x00400000 Log Start 0x00000000 Log End 0x00000C37 Log Size 3127 Bytes	
Display a module's comlog.	comlog getinfo <slot> comlog print <slot>	fortinetoem comlog getinfo fortinetoem comlog print
Clear a module's comlog. Either by resetting the a comlog start location in flash (reset_loc) or erasing all of the flash storage (chip_erase).	comlog clear [reset_loc] [chip_erase]	fortinetoem comlog clear
Disable a module's comlog	comlog disable	fortinetoem comlog clear
Enable comlog	comlog enable	fortinetoem comlog clear

Description	SMC SDI Commands	IPMI commands
Set comlog baud rate. <speed> can be 9600, 19200, 38400, 57600, 115200, or expressed as level 1 to 4.	<code>comlog setbaud <speed></code>	<code>fortinetoem comlog setbaud <speed></code>

System event log (SEL)

The SMC in each module generates system event log (SEL) messages that record system events as they occur. All SEL messages are stored by individual FIM and FPM module SMCs. They are also all collected and stored by the management module SMC. From the management module you can use the following commands to view and clear SEL messages.

Operation	SMC CLI Commands	IPMI Commands
Display the local SEL for a module.	<code>sel <slot></code>	<code>sel list</code> <code>sel elist</code> <code>-v sel list</code>
Clear the local SEL	<code>sel clear</code>	<code>sel clear</code>
Get SEL information	N/A	<code>sel info</code>
Get SEL time	<code>time get</code>	<code>sel time get</code>
Set SEL time	<code>time set <yyyy/mm/dd hh:mm:ss></code>	<code>sel time set</code>

Sensor data record (SDR)

The sensor data record (SDR) contains static information about the sensors in each chassis module. Information includes the Sensor ID string, sensor type, sensor event/reading type, entity id, entity instance, sensor unit, reading linearization parameters, sensor thresholds, and so on. The following commands display information stored in the SDR.

Operation	SMC CLI Commands	IPMI Commands
Display current local sensor values and sensor SDRs or sensor thresholds for a module.	<code>sensor <slot></code> <code>sensor_thresholds <slot></code>	<code>sensor</code> <code>sensor hexlist</code> <code>sdr list</code> <code>sdr elist</code> <code>-v sdr list</code> (-v required when using the Windows command prompt)

Operation	SMC CLI Commands	IPMI Commands
Set Sensor thresholds	N/A	<code>sensor thres help</code> (use this command to display online help for setting sensor thresholds)

Common management module CLI operations

The following table lists many of the operations you can perform from the management module CLI and the commands you use to perform them.

Action	SMC CLI Commands	IPMI Commands
Log into the CLI.	Ctrl-G	N/A
Log out of the CLI.	<code>exit</code> (followed by Ctrl-G)	N/A
Display all commands.	<code>help</code>	<code>help</code>
Display information about all SMC firmware in the chassis.	<code>info</code>	<code>mc info</code>
Display SMC device ID, Build Date/Number, SMC firmware information, address info, entity map for the device in the slot.	<code>info <slot></code>	N/A
Display status, power budget and hot swap state for all modules.	<code>status</code>	N/A
List the IPMI channels.	<code>channel list</code>	<code>channel info [<channel number>]</code>

Action	SMC CLI Commands	IPMI Commands
Change the SDI verbosity level. <level> can be: 0: Alerts + Errors 1: Alerts + Errors + Verbose + Low-Level Errors 2: Alerts + Errors + Verbose + Low-Level Errors + PI traffic 3: Alerts + Errors + Verbose + Low-Level Errors + PI traffic + IPMB traffic + LAN Interface traffic 4: Same as 3	<code>verbose <level></code>	N/A
Display the management module time	<code>time get</code>	<code>sel time get</code>
Set the management module time	<code>time set <yyy/mm/dd hh:mm:ss></code>	<code>sel time set <yyy/mm/dd hh:mm:ss></code>
Synchronize all module SMC times.	<code>time sync</code>	N/A
List management module user accounts.	<code>user list</code>	<code>user list [<channel number>]</code>
Disable a user account.	<code>user disable <user-id></code>	<code>user disable <user-id></code>
Enable a user account.	<code>user enable <user-id></code>	<code>user enable <user-id></code>
Set a user account user name.	<code>user set name <user-id> <name></code>	<code>user set name <user-id> <name></code>
Set a user account password.	<code>user set password <user-id> <password></code>	<code>user set password <user-id> <password></code>

Action	SMC CLI Commands	IPMI Commands
Set the privilege level that a user account has for a specified session-based IPMI <channel>. If a <channel> is not specified the privilege level is set for all IPMI channels.	<code>user priv <user-id> {callback user operator administrator no_access} [<channel>]</code>	<code>user priv <user id> <privilege level> [<channel number>]</code>
View a summary of users.	N/A	<code>user summary</code>
User test command.	N/A	<code>user test</code>
Display the management module serial interface settings.	<code>serial print</code>	N/A
Set the SDI baud rate.	<code>serial set sdi baud <speed></code>	N/A
Set the sniff baud rate when the console is disabled.	<code>serial set sdi default_sniff_baud <speed></code>	N/A
Enable a console connection from the management module to another module.	<code>serial set sdi enable <slot></code>	N/A
Disable the console connection between the management module and another module.	<code>serial set sdi disable <slot></code>	N/A
Cold or warm reset a module.	<code>mc reset <slot> cold</code> <code>mc reset <slot> warm</code>	<code>mc reset cold</code> <code>mc reset warm</code>
Run a module self test.	N/A	<code>mc selftest</code>
Power on a module.	<code>fru activate <slot> [<fruid>]</code>	<code>picmg activate</code>
Power off a module.	<code>fru deactivate <slot> [<fruid>]</code>	<code>picmg deactivate</code>

Action	SMC CLI Commands	IPMI Commands
Reset a module.	<code>fru reset <slot> [<fruid>]</code>	<code>picmg reset</code>
Power cycle the chassis	N/A	<code>chassis power cycle</code>
Get chassis sttatus	N/A	<code>chassis status</code>
Display the LAN configuration	<code>lan print <channel></code>	
Set LAN configuration. The <code>kgkey</code> and <code>krkey</code> options are used for RCMP+.	<code>lan set <channel> ipaddr <ip> [<netmask>]</code> <code>lan set <channel> macaddr <mac></code> <code>lan set <channel> defgw ipaddr <ip></code> <code>lan set <channel> defgw macaddr <mac></code> <code>lan set <channel> kgkey <value></code> <code>lan set <channel> krkey <value></code>	<code>lan set help</code> (use this command to display online help for LAN settings)
Enable or disable all LAN interfaces.	<code>lan enable</code> <code>lan disable</code>	<code>fortinetoem param set 0 1</code> <code>fortinetoem param set 0 0</code>
Set fan levels. Change or switch the active fan set.	<code>fan_min_level <0-20></code> <code>fan_max_level <0-20></code> <code>fan_set_switch</code>	N/A
Change LED settings.	N/A	<code>picmg led set help</code> (use this command to display online help for LED settings)
Display HPM.1 status.	N/A	<code>hpm check</code>
Perform HPM.1 upgrade	N/A	<code>hpm upgrade <.img> hpm upgrade <.img> all activate</code>

Cautions and Warnings

Environmental Specifications

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

Instructions de montage en rack - Les instructions de montage en rack suivantes ou similaires sont incluses avec les instructions d'installation:

Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.

Température ambiante élevée – S'il est installé dans un rack fermé ou à unités multiples, la température ambiante de fonctionnement de l'environnement du rack peut être supérieure à la température ambiante de la pièce. Par conséquent, il est important d'installer le matériel dans un environnement respectant la température ambiante maximale (T_{ma}) stipulée par le fabricant.

Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Ventilation réduite – Installation de l'équipement dans un rack doit être telle que la quantité de flux d'air nécessaire au bon fonctionnement de l'équipement n'est pas compromise.

Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Chargement Mécanique – Montage de l'équipement dans le rack doit être telle qu'une situation dangereuse n'est pas liée à un chargement mécanique inégal.

Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Surtension – Il convient de prendre l'ensemble des précautions nécessaires lors du branchement de l'équipement au circuit d'alimentation et être particulièrement attentif aux effets de la suralimentation sur le dispositif assurant une protection contre les courts-circuits et le câblage. Ainsi, il est recommandé de tenir compte du numéro d'identification de l'équipement.

Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Fiabilité de la mise à la terre – Fiabilité de la mise à la terre de l'équipement monté en rack doit être maintenue. Une attention particulière devrait être accordée aux connexions d'alimentation autres que les connexions directes au circuit de dérivation (par exemple de l'utilisation de bandes de puissance).

Blade Carriers, Cards and Modems must be Listed Accessories or Switch, Processor, Carrier and similar blades or cards should be UL Listed or Equivalent.

Serveur-blades, cartes et modems doivent être des accessoires listés ou commutateurs, processeurs, serveurs et similaire blades ou cartes doivent être listé UL ou équivalent.

Refer to specific Product Model Data Sheet for Environmental Specifications (Operating Temperature, Storage Temperature, Humidity, and Altitude).

Référez à la Fiche Technique de ce produit pour les caractéristiques environnementales (Température de fonctionnement, température de stockage, humidité et l'altitude).

Safety

Moving parts — Hazardous moving parts. Keep away from moving fan blades.

Pièces mobiles – Pièces mobiles dangereuses. Se tenir éloigné des lames mobiles du ventilateur.

Warning: Equipment intended for installation in Restricted Access Location.

Avertissement: Le matériel est conçu pour être installé dans un endroit où l'accès est restreint.

Warning: A readily accessible disconnect device shall be incorporated in the building installation wiring.

Avertissement: Un dispositif de déconnexion facilement accessible doit être incorporé dans l'installation électrique du bâtiment.

Battery – Risk of explosion if the battery is replaced by an incorrect type. Do not dispose of batteries in a fire. They may explode. Dispose of used batteries according to your local regulations. IMPORTANT: Switzerland: Annex 4.10 of SR814.013 applies to batteries.

Batterie – Risque d'explosion si la batterie est remplacée par un type incorrect. Ne jetez pas les batteries au feu. Ils peuvent exploser. Jetez les piles usagées conformément aux réglementations locales. IMPORTANT: Suisse: l'annexe 4.10 de SR814.013 s'appliquent aux batteries.

警告

本電池如果更換不正確會有爆炸的危險
請依製造商說明書處理用過之電池

Caution: Disconnect power supply cords before servicing

Attention: Débranchez les cordons de la source d'alimentation avant tout entretien.

Grounding — To prevent damage to your equipment, connections that enter from outside the building should pass through a lightning / surge protector, and be properly grounded. Use an electrostatic discharge workstation

(ESD) and/or wear an anti-static wrist strap while you work. In addition to the grounding terminal of the plug, on the back panel, there is another, separate terminal for earthing.

Mise à la terre — Pour éviter d'endommager votre matériel, assurez-vous que les branchements qui entrent à partir de l'extérieur du bâtiment passent par un parafoudre / parasurtenseur et sont correctement mis à la terre. Utilisez un poste de travail de décharge électrostatique (ESD) et / ou portez un bracelet anti-statique lorsque vous travaillez. Ce produit possède une borne de mise à la terre qui est prévu à l'arrière du produit, à ceci s'ajoute la mise à la terre de la prise.

This product has a separate protective earthing terminal provided on the back of the product in addition to the grounding terminal of the attachment plug. This separate protective earthing terminal must be permanently connected to earth with a green with yellow stripe conductor minimum size # 6 AWG and the connection is to be installed by a qualified service personnel.

Ce produit a une borne de mise à la terre séparé sur le dos de l'appareil, en plus de la borne de mise à la terre de la fiche de raccordement. Cette borne de mise à la terre séparée doit être connecté en permanence à la terre avec un conducteur vert avec la taille bande jaune de minimum # 6 AWG et la connexion doit être installé par un personnel qualifié.

Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space.

Attention: Un équipement monté sur bâti ne doit pas être utilisé sur une étagère ou dans un espace de travail.

Fiber optic transceiver must be rated 3.3V, 22mA max, Laser Class 1, UL certified component.

Le transceiver optique doit avoir les valeurs nominales de 3.3 V, maximum 22 mA, Laser Class 1, homologué UL.

Regulatory Notices

Federal Communication Commission (FCC) – USA

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received; including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

WARNING: Any changes or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Equipment Standard for Digital Equipment (ICES) – Canada

CAN ICES-3 (A) / NMB-3 (A)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Cet appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Conformity (CE) - EU

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.



Voluntary Control Council for Interference (VCCI) – Japan

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-A

Product Safety Electrical Appliance & Material (PSE) – Japan

日本では電気用品安全法(PSE)の規定により、同梱している電源コードは本製品の専用電源コードとして利用し、他の製品に使用しないでください。

Bureau of Standards Metrology and Inspection (BSMI) – Taiwan

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

China

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